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ABSTRACT

This guide, which is profusely illustrated with line drawings and diagrams, is intended to help teachers and trainers understand what different types of visual aids are available and how to make and use them effectively. Discussed in the introduction are general principles of training, teaching, communication, and methods. Covered next are general and special aspects of using aids effectively. Various types of aids are examined, including chalkboards, felt boards, photographs, charts and diagrams, diascopes, overhead projectors, filmstrips, films, loop films, closed-circuit television, models, and screens. Guidelines for indexing and preserving material and for organizing a learning resource center are presented. Described in a chapter on making aids are procedures for making various equipment, models, charts, felt boards, plastigraph, magnetic boards, slides, overhead projector illustrations, filmstrips, and 8-millimeter film loops. Lists of recommended materials, useful addresses, and suggestions for further reading conclude the guide. (MN)

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# A Guide to the Use of Visual Aids

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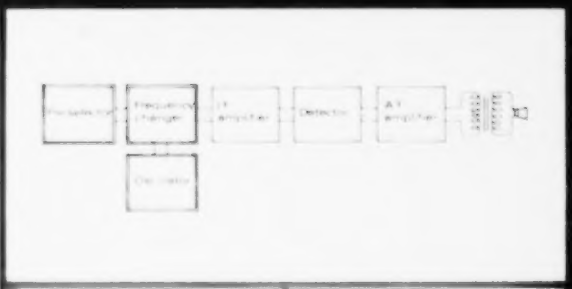

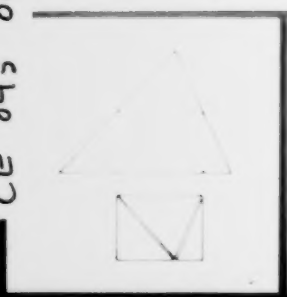

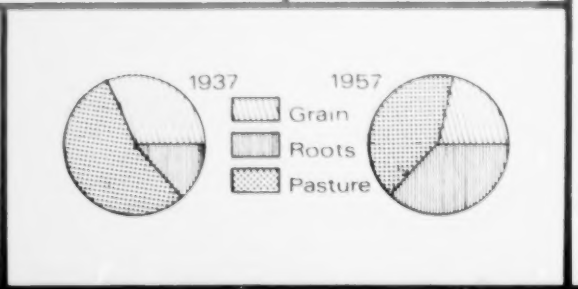


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# A Guide to the Use of Visual Aids

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# Introduction

**The enemies from within**

Those of us who teach and train others rely a great deal on talking: perhaps we talk too much. From the moment a man first rises to his feet to talk to an audience, his psychology tries to play tricks on him. If he is a beginner it sends a demon to frighten him with visions of listeners who know more than he does, to tell him that his timing will be wrong or to threaten him with loss of memory. So beginners may react by saying too much and taking too long over it. But as experience brings comfort, a new demon takes up the cause. This one shows the speaker his power and blames failure on his listeners.

Ordinary speakers never quite overcome either of these demons, but the best ones know the demons exist and try to persuade them to neutralise each other. There is one characteristic, however, which both demons have in common: they entice the speaker to rely more and more on talking. The aim of this booklet is to unmask them.

**Training and teaching**

The purpose of training is to enable a person to acquire a mental or physical skill in the least time. Without guidance or instruction, skill is acquired by making a series of attempts until a sense of familiarity, or mental and physical economy, or achievement, suggest that a particular attempt is directed towards the desired goal. That this way of learning can be uneconomical of time and indeed often unsuccessful is demonstrated, for example, by two-finger typists who, even though they work quickly, do not achieve the speed and accuracy of their correctly trained counterparts. Good training begins with competent instruction.

A good instructor must first know the skill which he is required to teach: this is an essential qualification. As a consequence of his work, the trainees will acquire this skill relatively quickly, and easily, and the transference of ideas — effective communication — is basic to this process.

Teaching is directed towards wisdom. Consequently teachers employ the time they are given in such a way as to make the most effective and valuable contribution they can to the spiritual, physical and mental growth of their pupils. There may be occasions when a teacher will decide to withdraw completely from his students, when he will let them garner their own knowledge, when they will learn beyond what he knows himself; but during much of the time, he and his pupils will be exchanging ideas and, again, if this is to be valuable, there must be effective communication.

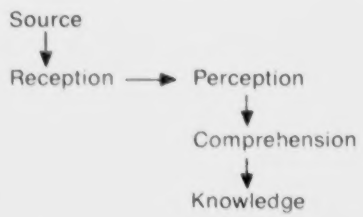
In what follows, most references will be made to students and teachers. This is simply a matter of convenient expression and the statements are generally applicable to most circumstances in which one person is giving information to others, whether the setting be a college or an industrial or commercial organisation.

**Communication**

The most important common factor in good teaching and good instructing is effective communication. Basically, it is used to evoke in the learner's mind similar patterns of ideas to those which exist in the teacher's mind. Whatever intermediate stages are involved, the learner must piece together these patterns from sensations of sound, sight, taste, smell and feeling. Because of an innate belief that words spoken by the teacher are the most important communication link between teacher and taught, we refer to other sources as though they were ancillary and call them aids. Yet there are countless occasions when spoken words are aids and the major source of communication is a picture or a movement.

Unfortunately, it is easy to be deceived by the apparent immediacy of visual perception when the response, 'I see', may be taken as meaning, 'I understand'. This is more likely to happen in public lectures than in small group teaching. Errors of judgment of this kind will most likely be avoided if the functions of aids are analysed: knowing the contributions they can make is basic to using them. An appreciation of this fact is more important in those aspects of training where testing is not possible than where it is normal procedure.

The sequence of the communication process can be reduced to simple components:




From such analysis we can see not only that failure is possible at every stage, but also that no one form of communication will invariably be the most effective one.

**Some notes on method**

Much research has led to the conclusion that people work more efficiently in a happy harmonious social atmosphere. But its being so widely known often obscures the more general fact that in such circumstances people do *most* things more efficiently: they digest their food better, relax more completely and sleep more soundly. Consequently, whilst first class social relationships between everyone in a group are an important basis for successful learning, the focal point of the group's effort must be provided by the teacher.

During a lesson, students learn some things by making a deliberate effort to do so. In this way they assimilate, to various degrees of understanding, some of the information which is taught. These efforts begin with the learner making a conscious decision that the subject matter is of interest to him — even if the interest is primarily directed to avoiding some unpleasant consequences of not knowing.

Because deliberate learning is acquired with effort, it is tiring; but, at the other end of the scale, some learning appears just to happen and no conscious effort is involved. This unwitting learning often has a powerful influence on the learner and constitutes an important element in propaganda, religion and tradition. Not only in schools, but also in homes, factories and offices, its effects are reflected in attitudes towards neatness, accuracy, safety, punctuality and behaviour as well as in actual subject knowledge, skill and experience.

Having decided that the subject matter is of interest to him, the learner prepares, introspectively, to meet the challenge which learning it entails. He will accept this challenge provided he believes that his efforts are likely to be successful, but if they appear to be predisposed to failure he will be demoralised, and any attempts he is persuaded to make will tend to be tentative and ineffective. The teacher should therefore begin each element of subject matter by giving his students a general idea of the whole of the matter which should eventually be known. In everyday terms he must give them a 'general idea of what it is all about' or, in the case of a skill, let them 'get the hang of it'. This will soften their initial apprehension and help to overcome the resistance to learning which it engenders. In many cases, the best way of doing this is to show a film or a series of pictures, to use a model or to demonstrate with apparatus: words alone often make impossibly heavy demands on creative and imaginative abilities at this stage.

Once students have acquired a general impression of the whole, its details must be taught until they are understood. This is usually easier for the learner if his attention is first directed to the simple aspects of the subject and then guided to increasingly complex ones, from particular examples to general ones and from the concrete to the abstract.

But in all this, difficulty, of itself, is not a deterrent; indeed it constitutes an essential attraction and since most knowledge becomes permanent only if it is overlearned, difficulty must often be injected into a subject in order to hold the learner's interest. For example, the multiplication tables become permanently known after they have been used over and over again to solve a wide variety of problems and not through learning them only sufficiently to repeat them.

Difficulty itself then, is not a deterrent, but expectation of failure erodes away the ability to face difficulty. A learner must believe that his efforts are directed towards success before he can feel truly motivated. Indeed, motivation is maintained and enhanced if he succeeds and knows he is being successful with every step he takes: this is the basis of programmed instruction or stimulus-response-reinforcement learning. In preparing material to support this kind of learning sequence, a set of visuals may constitute the stimulus steps, each demanding some response on the part of the student with the teacher providing the reinforcement (and a smile is a very powerful source of reinforcement).

Finally, because a desire for social approval spurs the will to work, learners need to assess their progress and to compare it with that of others. To do this they must give expression to what they have learned, and, to derive a full measure of incentive from this expression, their efforts should attract recognition.

Thus when a visual is prepared it should be designed as part of a particular process: it may be a cue to reliable perception, it may contribute to a learner's acquisition of the general idea of a whole area of subject matter, it may be a component in a stimulus-response-reinforcement sequence, or it may provide part or all of the challenge which leads to a learner's involvement in a problem.

# Using Aids Effectively

**General aspects**

Before considering the types of aids which are available it is wise to analyse the ways in which they can enhance a student's learning. This will make it possible to predict the part which a particular aid can play, and hence to prepare a well-balanced presentation.

Roughly speaking we can divide aids into two groups: those which amplify the effectiveness of the mechanics of the transmission and reception of sensations, and those which contribute to the teaching-learning process. In the first category are microphones, projectors, TV and so on; in the second are diagrams, models, gramophone records and similar equipment.

Irrespective of its function or effectiveness, an aid will often earn ancillary dividends by invoking co-operation. In using an aid, the teacher implies that he is aware of the existence of a difficulty — he confesses, as it were, to a sense of sympathy for his learners. Also, shown something — particularly if it has been made especially for them — students regard themselves as persons of greater consequence because the teacher thinks of them outside the actual lesson time, and takes an interest in their progress. This is equally true of a worker's response to his instructor or a selling agent's attitude to a manager of the company he serves. Indeed, even if the aid is only partly effective in illustrating the subject matter, students are likely to want to learn successfully in order to show their appreciation of the teacher's interest in them.

The value which is derived from this reaction is difficult to assess, but when good social relationships are enhanced by the teaching method itself, the resultant improvement in efficiency is focused on learning and not directed to relaxation.

**Special aspects**

The capacity of an aid for attracting attention can be two-edged. For example, strike a match and an entire group will look and wonder. They will go on looking for a while as they await an explanation. But if none is given, or if what follows seems to be an anticlimax, a reaction sets in and the students will direct their attention elsewhere — talk to one another, begin writing or reading — in order to redress the slight which made their eagerness seem foolish. Consequently, when an aid is used to attract attention, careful timing amplifies its effectiveness and something worthwhile should follow to justify the response. By all means let the aid become a focal point of attention: strike the match deliberately, watch it inquisitively and keep perfectly quiet. But when every mind is intent on the flame, use that moment of attention to teach something worthwhile and teach it forcefully.

Aids can supplement verbal explanations. One of the most delightful examples of this is Prokofiev's *Peter and the Wolf:* the story is made vibrantly alive by the music.

Fig. 1 is an aid which supplements a description. Fig. 2 is more fundamental since the illustration not only supplements the description but it also 'explains' its meaning.

If a critical word in a sentence is not understood, or is misunderstood, not only does the sentence become useless but the learner's belief in his prospect of success is weakened. Care in this respect is doubly necessary when a technical man is lecturing to a lay audience. A series of unillustrated sentences like:

'If we print hanging shoulder notes they must be considered, typographically, as part of the type area of the text'

could make a talk on the work of a typographer unintelligible to the general public; illustrated with

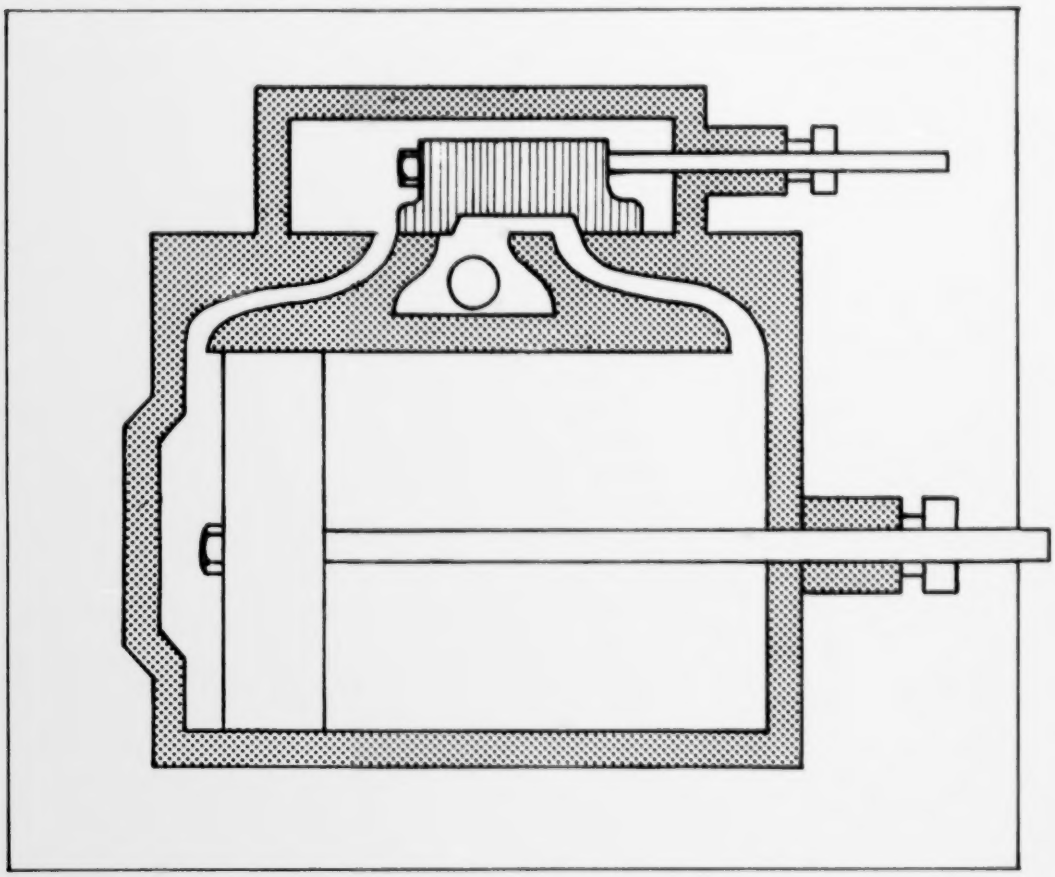
Fig. 1. The visual aid supplements the description

Fig. 2. Growing bud tied in to high-snagged rootstock. The visual aid 'explains' an unusual word

enlarged diagrams they could be components of an absorbing exposition.

An aid may be used to hold attention whilst a lesson is being taught. This, in an allied context, is the function of the pretty girls who find their way into advertisements of such unlikely things as Philpot's Self-Lubricating Ring Braces. A moving aid will generally hold attention for longer than a static one. The basic thermodynamics of heat engines, for example, might be taught with reference to a slowly pulsating home-made hot-air engine. Then, since this will be the focal point of attention, the lesson should be taught as an explanation and extension of the engine; it would be wasteful for the teacher to attempt to compete with it for his students' interest. This ability to become, in such circumstances, an unobtrusive commentator needs to be cultivated to the pitch of the students believing that they have learned from the aid alone. Not only will the learning then be easier but much more satisfying. Magnetic boards designed to illustrate mechanisms can be employed in this way with considerable success, provided the teacher works in the knowledge that the aid is the focus, and he is a mere extension of it (Fig. 3).

Fig. 3. A moving visual-aid used to illustrate the basic thermodynamics of heat engines

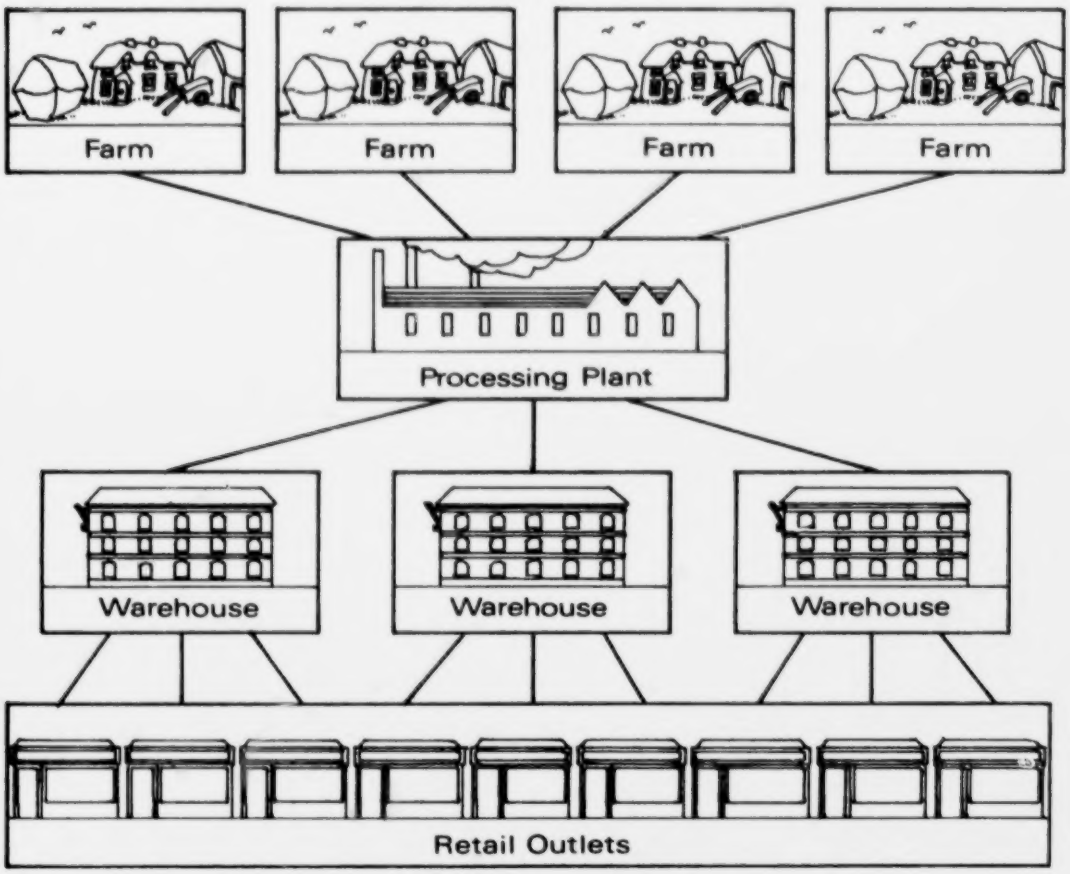


It is relevant to emphasise here that 'learning by doing' is often less efficient than 'learning by observing', for insights into problems are cultivated through mental activity rather than physical activity. Galperin, the distinguished Soviet psychologist goes so far as to conclude that 'practical activity tends to inhibit thinking', and that 'children learn better by observing a concrete demonstration and verbally anticipating the teacher's steps'! When students work in pairs in laboratories, those who organise, control and observe the experiments, often develop a deeper insight into the subject than their partners who actually perform them. Equally, a role-playing session is often of more value to the observers than to the participants.

Some aids are designed primarily to illustrate a relationship, in which case the relationship quality must dominate design and use — the pictorial quality should be unobtrusive. Fig. 4 shows this precept applied to a diagram where the message is made explicit by the design.

Demonstration apparatus is also used to illustrate a relationship and here the message derives largely from the way the equipment is handled and the form of the spoken commentary.

Fig. 4. An aid designed to show diagrammatically the stages in agricultural production



For example, the demonstration equipment in Fig. 5 is used to show the relationship between the rate and direction of the movement of a magnet relative to a coil and the consequent current in the coil circuit. Here, the meter should be large in size and set immediately above or below the coil so that the cause-effect connection can be seen and therefore perceived simultaneously. The two then become intellectually connected through their contiguity. Furthermore, the poles of the magnet should be visually differentiated — one, say, red and the other black in order to give visual emphasis to the 'direction' of the magnetic forces. The sense of the current induced in the windings may also be visually emphasised by means of a cut-out cardboard arrow. With this preparation the demonstration now becomes a true visual cue to the relationship being taught.

The teaching of mathematics offers a wide variety of aids used to this end. A large triangle can be scored as shown in Fig. 6 and then folded to show that the sum of its three angles is 180°. The actual presentation is, of course, most effective if the card is coloured on only one side.

Some quite complex mathematical relationships can be shown in visual or concrete form. A fairly elementary example is shown in Fig. 7 where squares and rectangles are built up on a magnetic board or felt board and re-arranged until the concept of a quadratic relationship has taken root. The best time to teach 'theory' is when the student, having understood the individual concrete examples, begins to find them time-consuming and looks around for an intellectually neater way of expressing himself.

This particular form of presentation of mathematics should be employed to create general belief in the subject matter to which the rigour of deductive mathematics will seem a rational climax.

Similar remarks apply to those aids which are valuable in illustrating the relationship between a rule and its application: the aim should be to teach through directed observation. One example from this category is the set of hinged transparent planes used in the teaching of first- and third-angle orthographic projection (Fig. 8), whilst another is the magnetic blackboard used in teaching 'rule-of-the-road' to nautical students.

The illustration of some relationships poses interesting problems. In making a history chart, for

Fig. 5. Equipment used to demonstrate the process of electromagnetic induction

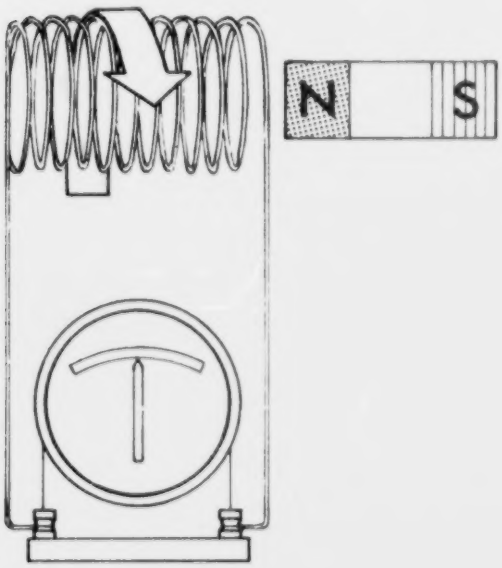
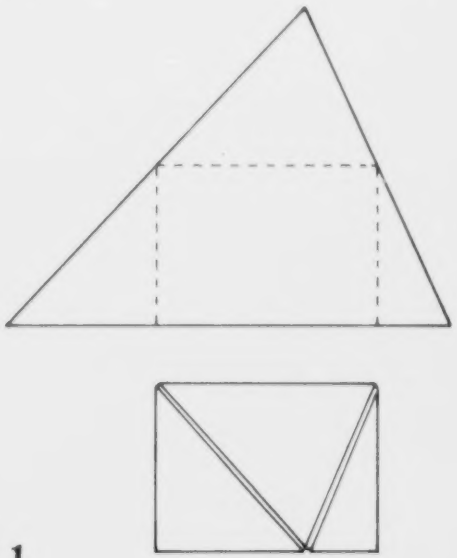



Fig. 6. 'The sum of the three angles of a triangle is 180°'



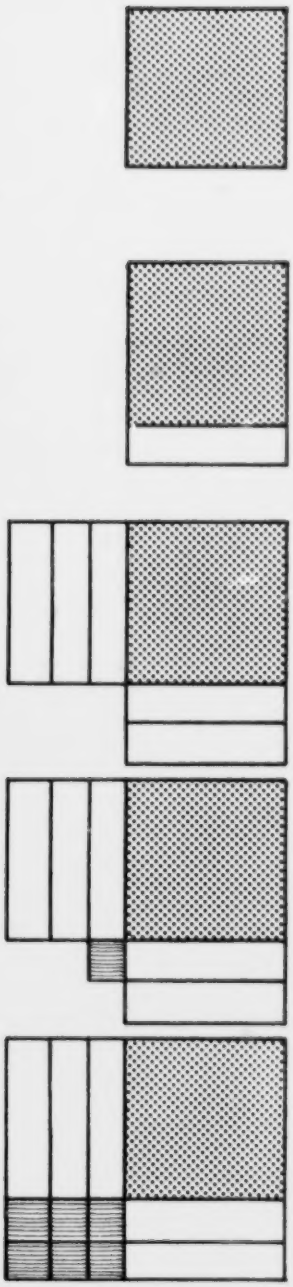


Fig. 7. A visual development of a quadratic relationship

example, should the time scale be linear or logarithmic? In other words, does 10,000 years 'look' a hundred times as long as 100 years or only twice as long? To decide, it is essential to draw it out and look at it.

Another quite distinct function of an aid may be to challenge. A colour plate in a cookery book could do this provided the standard it set did not seem impossibly high and the context in which the food was displayed did not appear socially foreign to the student. Aids which challenge learners do so, as a rule, either because they offer a reasonable opportunity of success — the crossword puzzle — or because they appear as a reasonably balanced battle of wits between the learner and the teacher. An example of the two types combined is found in the tape-recorded 'problem' for solution during a management role-playing session. This offers a dual challenge: one from the characters portrayed on the record ('We've got ourselves in a mess and you can't get us out of it!') and the second from the public nature of the solution. Consequently, the more 'real' the problem appears to be, the more likely the challenge is to be stimulating. It has been found, for example, that clips from excellent

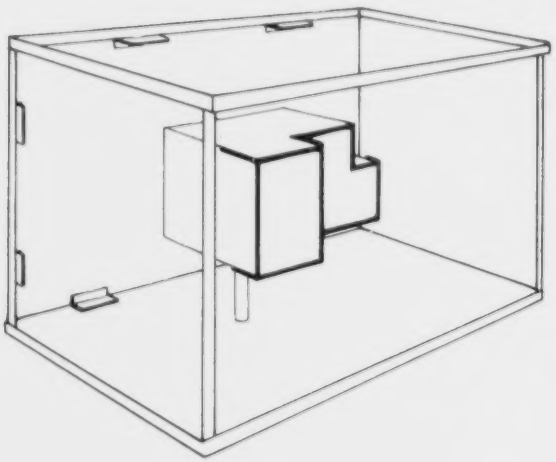


Fig. 8. Box made of Perspex for teaching principles of projection

feature films make a better basis for the analysis of human problems than do training films especially designed for this purpose.

The type of aid which requires a student to complete an incomplete drawing or sentence, the 'Trainer Tester', flash cards, aircraft recognition silhouettes and so on, can be the basis of challenge if the students associate the teacher closely with the exercise. Here, the attitude to encourage is comparable with that of a tennis coach stretching the capabilities of his pupil in a game. The students should want to 'beat' the teacher, should enjoy some success, and should believe that the teacher is also enjoying the evidence of their growing abilities.

Some challenges can be more subtle than this. For example, things on display which can be compared, one with the other, are often more attractive — and consequently more useful — to students because they feel drawn to find similarities and to evaluate them. In this category we have 'before' and 'after' examples, which range from samples showing the effects of processing, to illustrations of sequences in the development of a major project.

Finally, aids may be used to consolidate what has been learned, or to generalise. Such aids must be used after the subject matter has been learned in order to give it form and to show each learner the progress he has made.

Some films and filmstrips are valuable in this capacity; the felt board can be extremely useful, but for many teaching occasions there is nothing to compare with a summary of the lesson which has been built up on a chalkboard, step by step, as the lesson has progressed. This, because of its immediate association with the learning, is known to be completely relevant. Fig. 9 shows a chalkboard summary which has been built up during a lesson. Fig. 10 shows a summary in the form of diagrams on a felt board.

Appreciating the different kinds and qualities of effect which aids can have upon learners is the first and most crucial step to deriving value from them. It is important to decide what a particular phase in a lesson should cause students to *do* in order to learn most effectively: it is important to think in terms of behavioural objectives. And in designing or choosing an aid it is equally important to do so in terms of its effect on learning. With an objective in mind a teacher will use an aid with greater precision, greater force and consequently with more effect. An aid is a tool for learning and should be designed and used with the same discrimination as any craft tool. Beware the implied flattery of rapt attention.*

**To summarise**

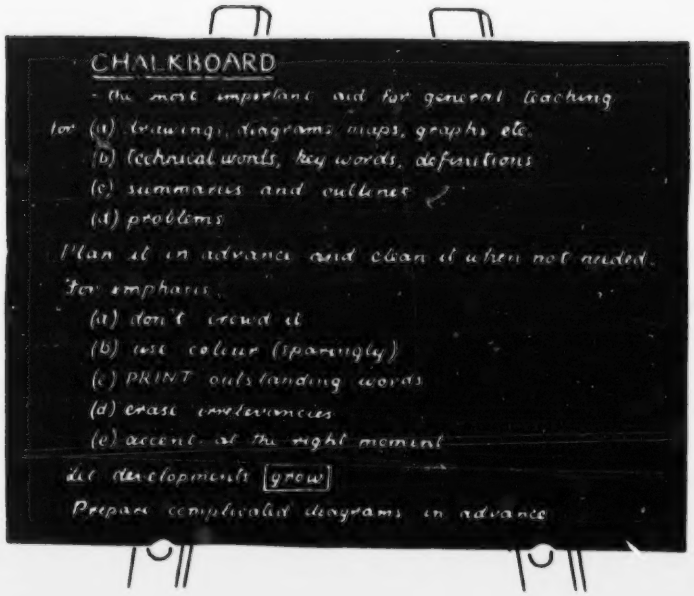
1. Aids can:
Invite co-operation
Attract attention
Explain words
Hold attention
Illustrate relationships
Challenge
Consolidate

2. Through unwitting learning, aids can help to change or strengthen attitudes.

3. The effective use of aids begins with understanding their potentialities and expecting no more from them than they can contribute.

*The fascinating subject of teaching methods is taken further in *An Induction Course for Teaching in Further Education and Industry*, by Patricia MacMillan and Len Powell, Pitman 1973.

Fig. 9. Chalkboard summary of a lecture


CHALKBOARD
- the most important aid for general teaching
for (a) drawing: diagrams, maps, graphs etc.
(b) technical words, key words, definitions
(c) summaries and outlines
(d) problems
Plan it in advance and clean it when not needed.
for emphasis
(a) don't crowd it
(b) use colour (sparingly)
(c) PRINT outstanding words
(d) erase irrelevancies
(e) accent at the right moment
let development grow
Prepare complicated diagrams in advance

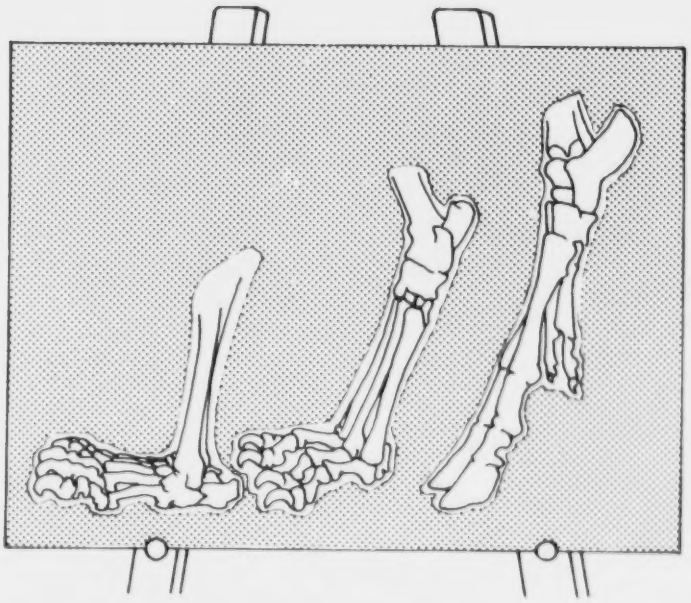


Fig. 10. Felt board summary in the form of diagrams

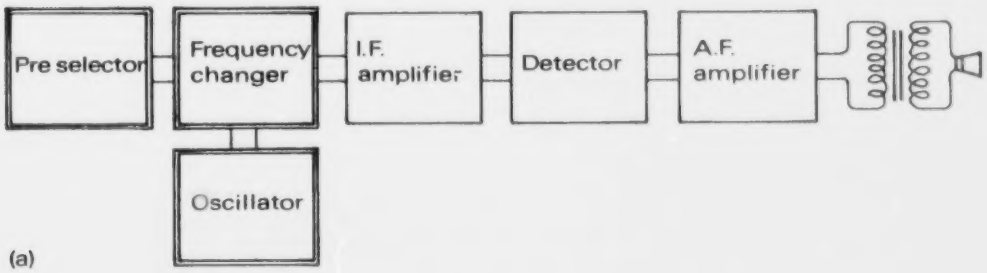
# Types of Aids

**Chalkboards**

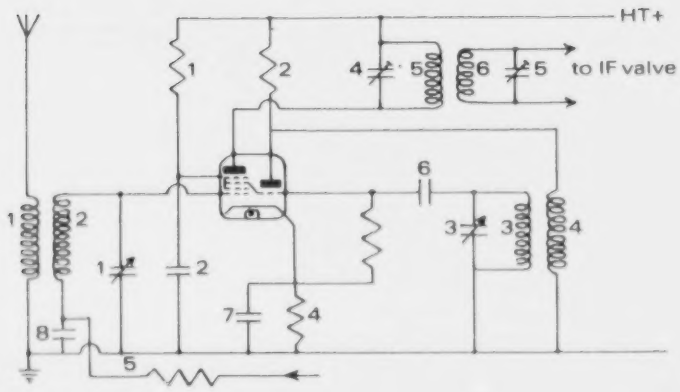
The chalkboard is the most common aid in general teaching. Conventionally white (or yellow) chalk is used on a black (or green) surface, but research since 1938* suggests that dark writing on light coloured surfaces offers a number of advantages.

For effective board work it is often useful to have one board on which the lesson summary can be developed and another for such illustrations, explanations and so on, as are needed for the current teaching. One obvious group of chalkboard subjects includes drawings, diagrams, maps and graphs. These are usually best drawn as their structures are explained so that students learn as they see. Consequently they should generally be simple even to the point of becoming block schematic diagrams. Complex details are usually far better presented as duplicated handouts for close study following a general treatment on the chalkboard. A typical pair of such presentations is shown in Fig. 11.

Where a complicated drawing must be made on a chalkboard it is wisest to prepare it before the lesson and then almost erase it. The teacher can then see the faint outline but the students cannot. This precaution ensures that the finished diagram will fit the board and be a reasonable shape. Of course, if there is no advantage to be gained from




(a)




(b)

Fig. 11. (a) Block diagram and, (b) circuit diagram for lecture on the history of radio receivers

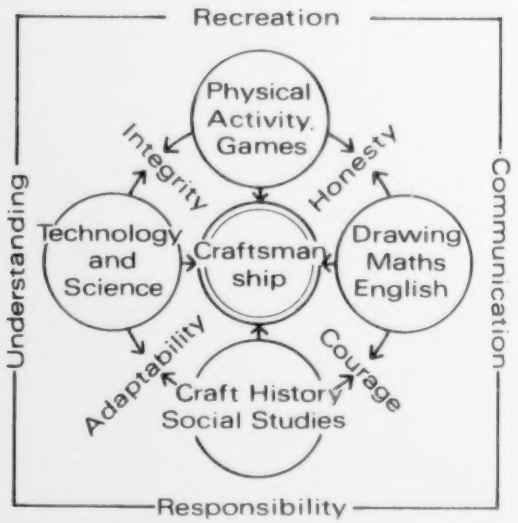
*See *Improving the Blackboard*, by W. Douglas Seymour. National Institute for Industrial Psychology, 1938; see also *BACIE Journal*, March 1970, pp 17-20.

'building up' the diagram, there is no point in erasing it unless it is to be used late in the lesson.

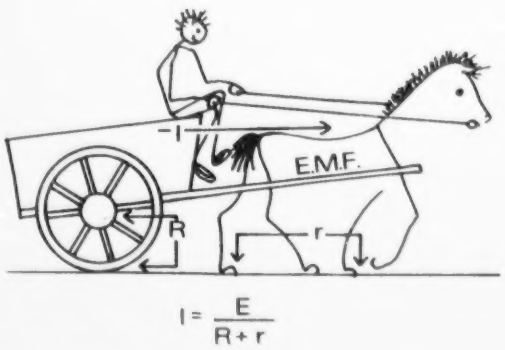
Technical words, key words and definitions are given extra force if they are written on the board as they are used. This gives definitiveness to the presentation and is an implied invitation to the students to write notes. Once such notes as these have served their immediate purpose they should be erased unless they form part of the summary. Similarly, problems and their solutions should remain on view for only as long as the students are using them: their transience gives emphasis to the dynamics of the learning and, if a summary is being developed, gives that the major prominence. At the end of the lesson, the latter should be the focus for the teacher's recapitulation.

It is difficult to generalise over so versatile an aid but, as a rule, it should be planned in advance and cleaned when it is not in use. For emphasis it should be uncrowded, colour may be used sparingly, outstanding words can be printed in capital letters or boxed in, and key words can be spoken and written simultaneously. Abstract ideas can be represented by shapes (Fig. 12a), people by stick figures (Fig. 12b), and quantities by size (Fig. 12c).

Matt near-white, or coloured plastic surfaces are excellent alternatives to chalkboards and so too are




(a) Course Correlation




(b) Ohm's Law

(c) Land Use

Fig. 12. Representation of ideas by pattern, analogy and geometry

large newsprint pads. In each case felt-tipped writers are used. Some of these contain water-based ink which can be erased by a water-damp cloth whilst the rest contain spirit-based ink which can be erased only with a spirit — methylated spirit or spirit duplicator fluid. When paper pads are used in appropriate circumstances — each sheet being torn off as it is finished with, and thrown in a waste bin — it gives quite an impressive suggestion of the teacher's mastery of his visual aid medium, whilst, at the same time enabling him lightly to outline each diagram in advance. This alternative is especially useful in such lectures as sales talks where, in order to acknowledge the persuasive element in the situation, nothing should imply the teacher-taught relationship with power psychologically vested in the teacher.

**Felt boards — Plastigraph**

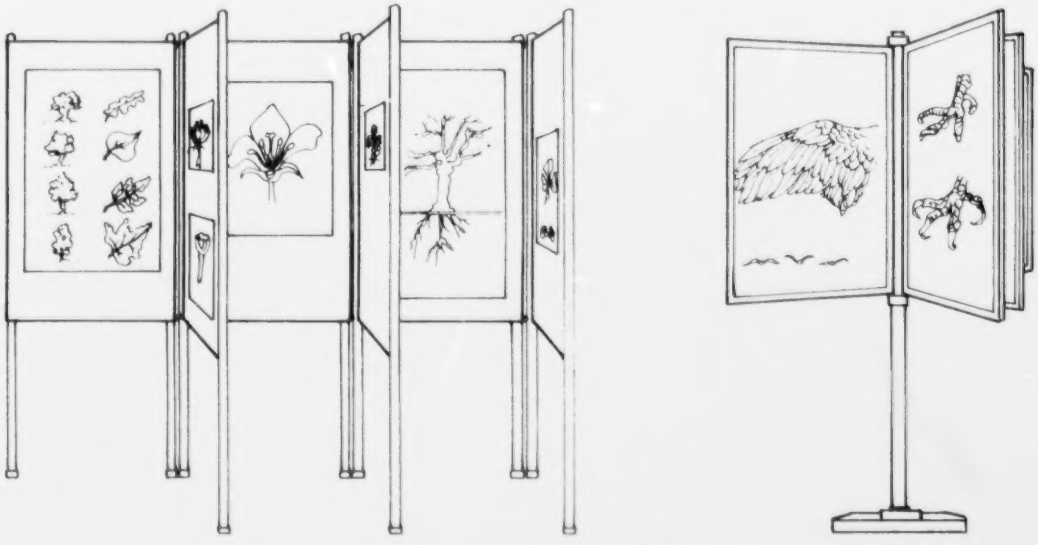
Surfaces on to which shapes, diagrams and captions can be fixed, simply by placing them in position, are specialised alternatives to the chalkboard. They can be used with very large groups of people because the prepared material can be made suitably bold. With these devices the display of visual data and the recording of summaries is a matter of a moment and does not interfere with the flow of discourse: it can, quite dramatically, accentuate the essential steps in a lecture sequence. Of course, the fact of having prepared material reduces both the versatility of this group of aids, as compared with the chalkboard, and also the intimacy of the presentation.

Plastigraph comes in very bright colours, can be cut into well-defined shapes, and has a strong visual appeal, but folded pieces have to be peeled apart and dust can interfere with adhesion. The soft pliability of felt, on the other hand, makes the mechanics of using this medium quite unobtrusive.

**Magnetic boards**

These consist of sheets of iron or tinplate — often painted so that they will also serve as chalkboards — on to which shapes, backed with magnets, will adhere. Such aids are particularly useful for showing the effect of moving shapes to different positions; the stages in the cycle of movement of a mechanism, traffic problems, work study and economics problems. They can be used with the same dramatic effect as felt boards, but are really

Fig. 13. Charts mounted for display in a room



better employed where sustained observation is necessary. The magnetic materials used with these boards include metal disc magnets, magnetic plastic strip which can be cut or broken, coloured magnetic plastic sheeting which can be cut with scissors and magnetic string.

**Photographs**

The chief value of a photograph derives from its air of authenticity: in the viewer's mind there is no immediate reason for its being 'untrue', and any distortions will be foreshortenings of perspective which are accepted as a reasonable challenge to his ability to translate two dimensions into three. For the most part, photographs should be studied individually and without haste, and learners should know precisely why they are studying them. One technique is to use waiting time during practical sessions for this purpose, another to display them in the coffee lounge, as these occasions offer good opportunities for informal discussion.

Photographs, however, generally carry more information than corresponding line drawings and consequently they are, as a rule, more suitable for mature students. Photographs taken at stages during the development of a project, or on a field trip, can facilitate follow-up study. Of special value are Polaroid photographs made of learners performing skills or of stages in a 'high speed' experiment. These 'frozen movements' can give unique information and, in certain circumstances, can reinforce or correct very powerfully since the picture is processed almost immediately it is taken.

Good photographs appropriate to a course of study, which have been enlarged to, say, about 600 mm. x 450 mm., mounted in a deep frame and changed periodically, never fail to attract intelligent interest. Smaller photographs, for example those which have been cut from periodicals, should be mounted on stiff card of uniform size as this facilitates storage and turns the scrap of paper into a workmanlike instrument.

**Charts and diagrams**

These fall into two main categories: those to be used as lesson illustrations which should be bold and clear, and those for wall display which should be of sufficient interest to attract attention, and carry sufficient detail to warrant inspection and contemplation. The former supplement teaching and consequently will be complete only when they are used by a teacher: the latter must not only tell a whole story, but should contain some detail in order to justify the attention they claim. This, of course, does not apply to charts used to create atmosphere or orientate attitudes, which, since they are designed to promote unwitting learning, should be acceptably obtrusive, well defined and framed in such a way as to become an integral part of the visual structure. Among the most successful examples of this type of display are the London Passenger Transport Board posters. Charts mounted flat on a wall are less likely to be looked at than those which break the line of the wall surface. Even more demanding of attention are those which move in some way — say like the pages of a book — or those which are mounted for instance, in the centre of a room (Fig. 13).

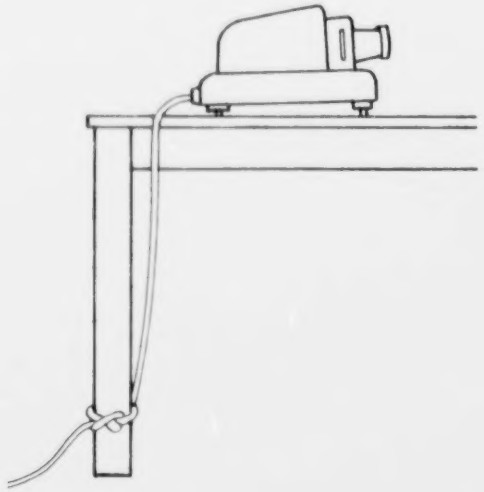
**Diascopes**

Before using projectors, teachers should take some basic precautions to ensure an elegant performance:

(a) See that the electric lead is safely connected: if it is pulled, it should break at a socket but not move the instrument (Fig. 14).

(b) Focus the projector on the screen.

Fig. 14. Power flex fastened to table leg for safety



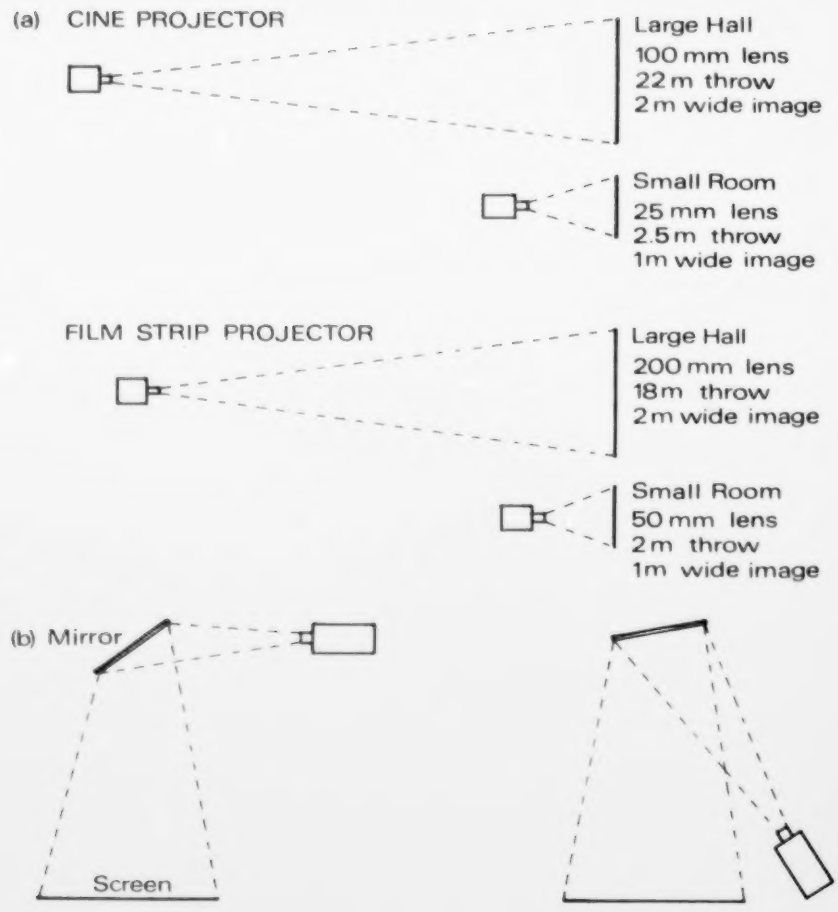



Fig. 15. (a) Select a lens to suit the length of throw and size of screen by consulting a lens table
(b) Background projection arrangements

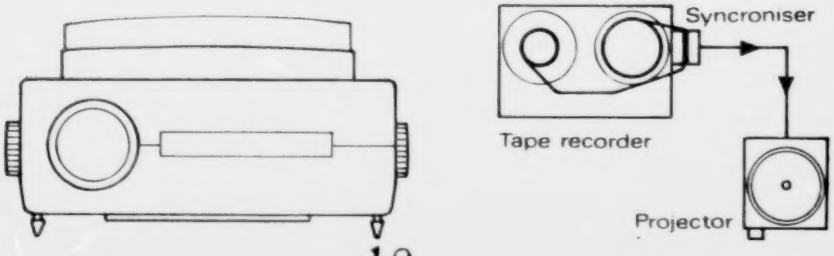



Fig. 16. Slide projector with slide magazine, and tape/slide arrangement

Remember that if the axis of the beam is not at right angles to the screen, the image will be a trapezium and not a rectangle. Check the screen brightness from the widest viewing angle.

(c) Check the seating and the lighting: remember — halve the distance from the projector to the screen and the image will be smaller but four times as bright.

(d) To prepare a film, check the sound and run the film through to the title, prior to the lesson. When the time comes to project, switch on the sound and wait for the amplifier to warm up (the speaker will begin to hum), switch on the motor and, as the titling appears on the screen, signal for the room lights to be extinguished.

Modern projectors are so efficient that slides can be used without blacking out and, with a proper choice of lens and screen, the projector can be placed almost anywhere in the room (Fig. 15).

Slides can be bought already prepared or they can be made photographically. Used by a good lecturer they are one of the finest forms of visual aid, since they can be brilliantly clear and so much part of the lecturer's presentation as to resemble the solo instrument in a concerto. Photographic slides have a much greater tonal range than prints and as a consequence projected pictures can be truly beautiful. With the help of slides, lectures in geography, architecture, natural history and so on, can be made occasions of aesthetic delight as well as lucid instruction.

Projectors fitted with slide magazines, which can be focused and operated by remote control are available for 50 mm. slides. This relieves the lecturer of talking from the projector or relying on an assistant.

A synchroniser is a device with which a tape recorder controls a slide projector so that the commentary is illustrated automatically (Fig. 16). It is easy to use and, indeed, some tape recorders have built-in synchronisers.

**The overhead projector**

With an overhead projector (Fig. 17), slides of any size up to transparencies of about 250 mm. square can be screened. This extraordinarily useful instrument enables the teacher to face his class all the time he is illustrating his teaching. He can build up diagrams in stages by using a series of transparent overlays or he can project what he writes as he writes it on a sheet of plastic which rests on the copy surface. So important is this instrument that the author has devoted a separate booklet to it.*

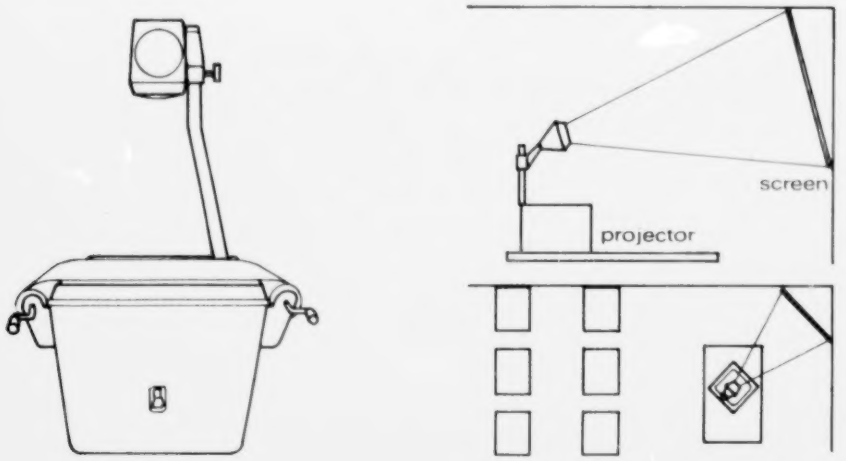



Fig. 17. Overhead projector and a suitable setting in a low-pitched room

*A *Guide to the Overhead Projector*, by L. S. Powell. BACIE 2nd ed. 2nd rev. impress. 1974.

**Filmstrips**

These are simply a sequence of transparencies on 35 mm. film, and are used in the same fashion as slides. There is a very wide selection available commercially, both in black-and-white and in colour.

Most strips consist of some 20 to 40 frames, each frame being 18 mm. x 24 mm.* and called single frame size. Two other sizes are met, 24 mm. x 24 mm. or square frame, and 36 mm. x 24 mm. or double frame. Projectors are usually equipped with masks to enable frames of any of these sizes to be shown effectively.

Commercially produced filmstrips are sold with sets of notes prepared for the teacher. These should be studied before the strip is used and not read during the lesson, because when a teacher reads the notes his presentation lacks the first-hand spontaneity which enlivens teaching and the class receive the impression that he is not familiar with the subject.

Microscope slides are a special form of transparency, and are projected from an instrument called a micro-projector.

Opaque pictures can be screened with an opaque projector or episcope. The most modern instruments of this type will project copies of up to 250 mm. square, accommodate books and give adequate images in a room which, while not well-lit, is not blacked out. The older opaque projectors can be used only in blacked-out rooms.

The technique of using this instrument is similar to that of using charts. The room should not be darkened until the moment the picture is to be shown, and lit up immediately afterwards. Attention should be focused on any aspects of the picture, which should be observed by using a pointer or, better still, by standing at the screen and pointing.

**Films**

Films differ from other projected aids in that, whilst a film is showing, it takes over the teacher's role completely. Consequently it must be of sufficient merit to justify its solo performance, and this, in turn, means that it must be pre-viewed, pre-set if possible, and carefully introduced. Except when it is used either to consolidate what has already been learned or to orientate attitudes, it should generally be shown twice. The first showing, which gives an idea of its content and sequence, should be followed by a discussion, or teaching, during which the students become clearly informed of what they can learn from the film. When they are ready for it and know precisely what they want from it, they should see it again. It follows that teaching films should be reasonably short. Between four and ten minutes showing time is a good general length.

Film equipment should be maintained in good condition and carefully used, and anyone who intends to use films would be well advised to seek expert guidance on the care and maintenance of projectors.

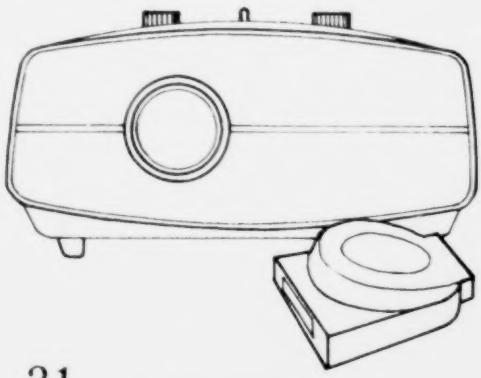
**Loop films**

A loop film is a length of 8 mm. film with its ends joined together so that once it is in a loop film projector it will run from beginning to end over and over again until the instrument is switched off (Fig. 18). The film is sealed in a plastic cassette and may be of any length from about 2 metres (half a minute running time) to 15 metres (4 minutes running time). Loop films are silent films, although sound versions are marketed.

The four special characteristics of silent loop films which can be exploited are:

1. The information is communicated entirely visually.

Fig. 18. Loop film and one form of projector



*Picture frame size 17 mm. x 23 mm.

2. The film can show movement.
3. It can be viewed over and over again until its message is fully understood.
4. It is brief.

Such a film is therefore appropriate for illustrating the performance of a skill such as pruning a fruit tree, sharpening a saw or turning a taper and for assisting learners to form adequate concepts, such as the concept of a magnetic field, of crop rotation, servo-control and colour harmony.*

**Closed-circuit television (CCTV)**

The fact that broadcast educational television must be designed for a very large heterogeneous audience is one of its great strengths — it can be generously conceived — and one of its great weaknesses — it cannot be closely concerned with the learning needs of one particular community. This weakness can be eliminated by the community itself operating its own self-contained television: a closed-circuit television system. Although most such systems are, indeed, pieces of apparatus joined into the same circuit by wires, some include short micro-wave links in which the signals are transmitted and received by aerials.

Closed-circuit television may be used to link the learning centres of whole cities or a group of buildings, or it may be set up in a single room to make the transmission, recording and reception of information more effective or more elegant. This section is concerned only with the use of closed-circuit television on a small scale.

Very generally, closed-circuit television can be used in three ways: as an episcope, as a mirror with a short time-lag and as a recording-playback device comparable with cinephotography.

When it is used as an episcope, two components are needed: a television camera and a simple kind of television set called a monitor. When they are linked together and switched on the monitor displays whatever is in focus to the camera (Fig. 19). The size of object needed to fill a monitor screen depends upon the camera lens so it is generally useful to choose a zoom lens which can vary from a telephoto to a wide-angle setting. This enables the speaker to display magnified images of small objects on the one hand and reduced images of large objects on the other. Of course, picture quality cannot be ignored but it seems to have about the same significance as the reflective power of a mirror: if you really want to see whether your slip is showing a shop window will suit admirably.

Used for looking at things, closed-circuit television has advantages over episcopes. It is silent, it needs no black-out and almost no adjustment when in use; the screen can be sited anywhere, even in another room, and the camera can be connected to a number of separate monitors. For operating comfort the presenter usually has a small desk monitor or one attached to the camera so that he can see what is being displayed on the viewers' screen.

Other circumstances in which this arrangement is useful include the viewing of dangerous processes, of things which cannot be conveniently reached and seen by learners, of images seen in a microscope and of surgical operations as they are being performed.

It is also useful in making expensive laboratory equipment more cost effective. For example, with a camera focused on the instrument dials of a test engine all students in a group can take readings from the monitor screens. In turn they can manipulate the equipment sufficiently to know about it and understand how to use it. For the rest of the time they can prepare their results and

Fig. 19. Television camera and monitor linked together and used as an episcope

*The reader wanting more information about the 8 mm. loop film is referred to *A Guide to the 8 mm. Loop Film*, by G. H. Powell and L. S. Powell. BACIE, 1967.

reports and participate in discussion with the instructor. This not only multiplies, as it were, the availability of expensive equipment but makes possible a better correlation of theory and practice.

The addition of a video tape recorder to the chain makes available an extra facility: the opportunity to play back material which has been recorded. The recording tape of a VTR may pass from one spool across the recording head to another spool, when the instrument is called an open reel recorder, or the tape may be enclosed in a plastic box, when it is called a cassette recorder.

Playing back taped material may take one of two forms, both of them useful. It may occur some time after recording, in which case the sound and images are effectively a stored record. Alternatively, it may be used to play back *immediately* a very short bit of behaviour in which case it acts more like a mirror with a slight delay built into it (Fig. 20). This latter technique is characteristic of a training process called micro-training. For this process it is much easier to use an open reel recorder than a cassette type which takes more time to re-set after each micro-recording. This technique has a place in training students to teach, discuss, interview, sell and generally manage others.

Cassette video recorders have considerable advantages. They play in colour, cassettes are easy to store and the equipment very easy to use.

A second camera opens up entirely new production opportunities and enables studio-type presentations to be made. It can also lead to the employment of a team of people consisting of at least a producer, floor manager, two camera operators and a presenter (Fig. 21). The equipment, too, may now become more complex. The cameras must be synchronized so that the picture is steady after switching from one to the other. The producer needs three monitors, one showing what each camera sees and the third showing what is currently being transmitted. He will need to speak to the camera operators and the floor manager and this means using a sound link for the purpose.

Naturally, equipment of this complexity must be selected with forethought and understanding and must be seen as quite different in its implications from a single camera chain. And since the steps that can follow involve buying a caption camera, a tape recorder and record player, telecine equipment, more lights, more assistants, etc., etc., a serious costing exercise should precede this development.



**Models**

These are the closest alternatives to real things and often more suitable for teaching purposes. Since they attract considerable interest and invite close attention, they should be sufficiently robust to withstand handling. In general, they should be left on view for long enough to satisfy the students' needs and then be returned to store.

**Other aids**

Other aids include actual objects, maps, specimens, sand tables, manuals and textbooks, tapes and gramophone records. When tape recorders are used for recording talks or playlets, button-hole microphones are often more convenient than larger ones. During courses of lectures and conferences, particularly those employing the syndicate technique, a valuable variation of the conventional summary is to prepare a recorded summary on a tape. Each group leader or lecturer is asked to record a précis of his contribution which is then played back during the final meeting. Because it gives a measure of permanence to the spoken word, it tends to force speakers to assess just what of their contribution is of outstanding importance.

The apparatus which needs the greatest care and understanding is the gramophone, and anyone who uses it should first learn how to do so from an expert. Records and instrument should be kept scrupulously clean and the pick-up stylus should be expertly examined with a microscope after half its advertised playing life. Fingers should never touch record grooves and the instrument should be handled with delicate skill — almost affection.

Since there is now little to choose between the quality of reproduction from a cassette tape on a good recorder and a recorder player, the former is the instrument to choose for training and education as it is relatively resistant to casual handling.

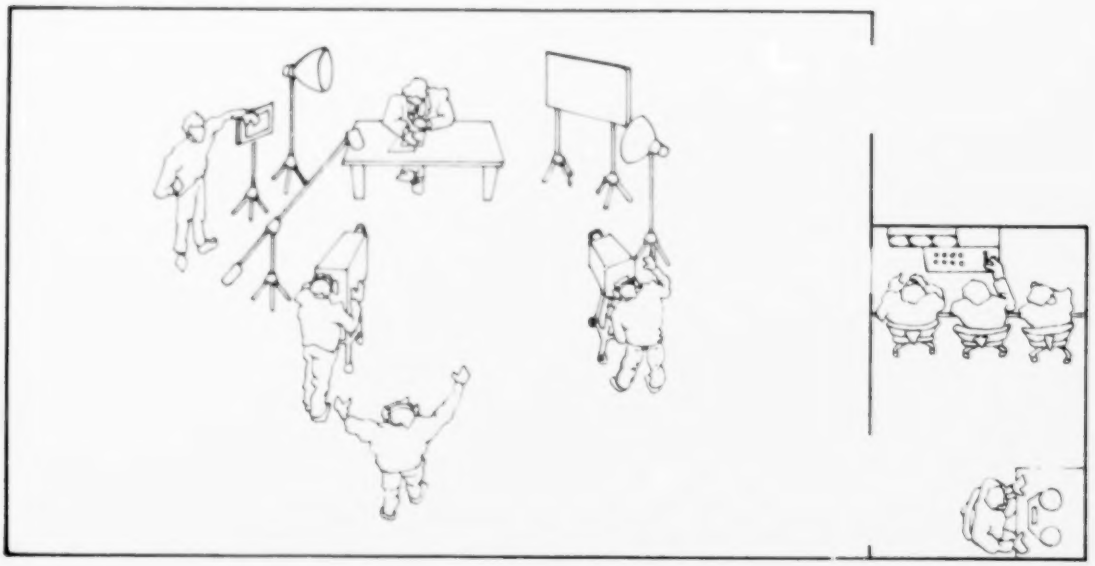
**Screens**

There are two types of projection screen: the opaque type from which images are reflected, e.g., cinema screens, and translucent screens through which light is transmitted.

Opaque screens may be matt white surfaces, in which case light is more or less uniformly reflected in all directions, and the image can be seen equally well from all sides. They may, on the other hand, be

Fig. 20. A video tape recorder can be used in micro-training to play back behaviour after a short time-delay

Fig. 21. A second television camera opens up new production opportunities



treated with a coating of, for example, finely divided glass beads, which reflect most of the light back from the screen in a divergent beam embracing an angle of about 60°. This gives a clearer image within the beam, and a dimmer one outside it. Every type of opaque screen gives the best results when no strong direct light reaches it from the front and when it is contained in a black frame. Consequently, if viewing is difficult, the screen should be made the back inside wall of a black box, which is open at the front.

Translucent screens, generally speaking, are more directional than opaque ones, and must be so arranged that no direct light reaches their back surface. They are extraordinarily useful for small groups in bright classrooms where, as part of a back-projection arrangement, they can be used without blackout.

There is no virtue in an unnecessarily large screen for it makes viewing tiring. A screen 900 mm. x 600 mm. would be quite large enough for an ordinary classroom of 10 m. x 7 m.* For most comfortable viewing the front row should be a distance of at least 2w. from the screen and the back row at most 6w, where w is the width of the screen. The group should sit within an angle of 60° from the screen and no member should have to look upwards or downwards more than 30° to the horizontal.

**Indexing and preserving material**

In order to derive a full return from the amount of time and material invested in teaching aids, some attention should be given to storing them wisely. Because of their cost, films may be hired when they are needed, or bought and stored centrally. It is essential that every potential user should have precise and up-to-date instructions on how to obtain and show a film: he should have access to up-to-date catalogues. Loop films are ideal for storage on the shelves of a book library and because each one will be concerned with only one specific topic they can be classified in the usual way.

Filmstrips can be stored centrally in one of the special cabinets designed for this purpose; there must also be a corresponding file for the notes. Somebody, preferably a librarian, should be responsible for the collection or it will become muddled and dispersed. The strips should be classified in the same way as library books — if there is no library a simplified version of the Dewey system can be prepared and will serve admirably.

Overhead projector transparencies should be stored in book-like boxes or cases which can be indexed on their spines and stored on bookshelves in a library.

50 mm. transparencies can be filed in office-type filing cabinets by using the special plastic containers made for this purpose. Alternatively, slides can be stored on bookshelves in projection magazines and these indexed in the usual way. Indeed, book libraries are often the best centres for the storage of films, strips, transparencies, gramophone records, tapes and teaching programmes since only trained librarians are able to cope with the problem of cataloguing the material efficiently and since, together with books, they are all sources of information directed towards effective learning.

Charts are best stored open and hanging, a useful method being to punch and reinforce two holes in their top edges and slide them over pegs fixed to a wall. Valuable pictures can be stored in plastic envelopes or mounted on board and varnished. An extremely useful protective film (either glossy or matt) is available. It is simply smoothed on to the chart and sticks firmly without distorting in any way.

Episcope pictures can be mounted on standardised black cards and indexed in the usual way. Where diagrams in a book have been found useful, white cards referring to them can be inserted in the index.

Felt diagrams, Plastigraph diagrams and cut-outs for magnetic boards can be kept in a filing cabinet, each group in a manilla folder.

*See *Kodak Projection Calculator and Seating Guide*. Kodak Ltd, London; or *Audiovisual Projection*, also published by Kodak.

# Learning Resources Centres

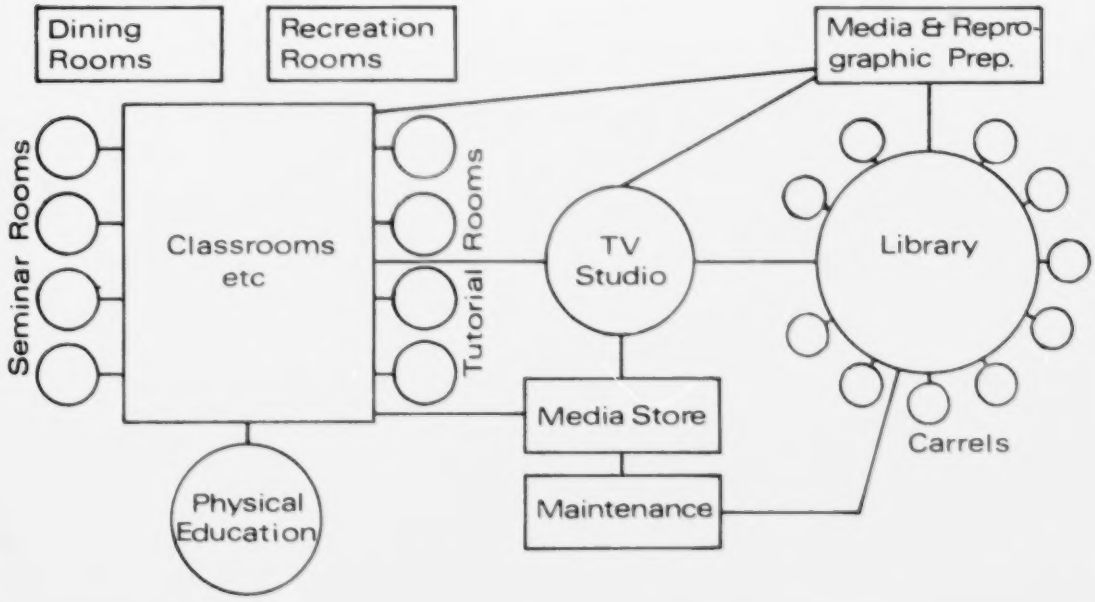
A learning resources centre is a storehouse of materials from which people can learn what they want to learn with a fair chance of doing it well. It is an honest development and not an educational plaything: indeed, many libraries began some years ago to diversify their wares in response to demand. A number of them built up record libraries, others picture libraries, and in doing so recognised that some ideas could not be exchanged solely through the medium of print.

A resources centre is generated from the recognition of three facts. Firstly, some ideas cannot be reliably communicated through books: music, for example, must be heard, paintings seen, perfumes smelt and wines tasted. Secondly, people are different from one another: some learn some things best by reading, others by hearing, others by writing and so on, and most by combining two or more activities. Thirdly, whilst some people learn best in groups others do better on their own and, generally speaking, we all need some kind of private learning from time to time.

If we were to stop here and say that all we needed to do was store ideas in different formats, there would be no great problem. But the very existence of variety itself creates new problems for the librarian. Two items on Beethoven's seventh symphony — a record and a book, say — can be used in three different ways: the record on its own, the book on its own or the two together. Three items — a record, book and film — can be used in seven different ways, and this is assuming that no selection of items or passages is made. The librarian is therefore presented with a new problem of storage and retrieval: should the items be stored separately, books with books, records with records and so on, or should the materials relating to specific subjects be stored together irrespective of their format?

The most general solution to this problem is to

Fig. 22. Diagram of total school or college resources



store as 'packages' those groups of media that have been brought together by an author or compiler and to keep separately those which have not. The assembly of related but separately stored material is then facilitated by efficient indexing and cross referencing.

Then there is the matter of using the material. When a reader borrows a book he is also provided with a chair and table at which he can read it. Extending this facility to other media means providing record players, tape recorders, projectors of various kinds, video-tape equipment and so on. Furthermore, this equipment must be set up in such a way that it can be used without causing distractions to others.

With such a varied assortment of learning sources and facilities, two other functions of a resources centre almost create themselves: the production of new learning materials and the provision of advice on how best to exploit the media available. A fully fledged resources centre, then, has three roles:

1. The storage and retrieval of learning media.
2. The creation and production of learning materials.
3. Instruction and advice on the utilisation of the facilities available.

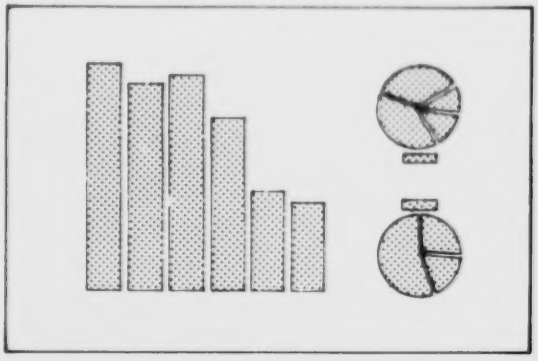
But then there is another problem. Who gives advice on what to store, how to store it, what to borrow and how to use it, what playback facilities are needed, where they should be sited and how they are to be serviced? Such a responsibility calls for a manager with the insight of a librarian coupled with the knowledge of an educationist. He could be a librarian with further special training or an educationist with further special training or a manager with further special training. But he will need to be a person of substance with a flair for establishing good relationships. He will be the resources centre director.

**The centre**

The physical provision of a learning place in which a resources centre plays its part will include the usual classrooms, seminar rooms, tutorial rooms and so on, but these will be designed to permit the fullest exploitation of the learning media and assistance which the centre provides. Seminar rooms, for example, might well be designed with a fifth sloping wall to act as an overhead projector screen; they will have ample electric socket outlets and possibly a video link with the television studio.

The centre area will include a library or information department, carrels (sound insulated booths wired for projectors and recorders), a television studio and possibly a mobile television van, a media store, a media and reprographic preparation area and a maintenance section. The whole provision is shown in diagram form in Fig. 22. With a modification of scale this could set the pattern for a conference wing of a hotel, a training centre, a management college or a college of technology.

Fig. 23. Outlines are accentuated by the spacing of masses. The circles are placed closer to the edge than the rectangles in order to give visual balance



# Making Aids

**Equipment**
Good quality tools and materials usually evoke better quality work. It is easier, for instance, to draw slick freehand lines with a soft pencil, to write with a medium pencil, to draw accurately with a hard pencil, to hold a long pencil and to care for a good pencil. Although this is widely true, it is best to keep stocks to a minimum — in any case, ideas change and some materials deteriorate.

**Models**
It is beyond the scope of this booklet to discuss the making of models, but the value of cardboard, balsa wood, soap, expanded polystyrene and such easily worked materials should not be overlooked.

**Charts**
The basic materials needed to produce charts are paper, pencils, erasers, paint, brushes, crayons, pens and ink. Paper varies in quality from rag paper ('hot pressed' for diagrams and 'not pressed' for colour washes) to newsprint; it varies too in thickness, strength and colour. The most generally useful is good quality cartridge paper in A1 sheets which measure 560 mm. x 760 mm., and coloured manilla card in double crown sheets, which measure 508 mm. x 762 mm.: if at all possible, paper should not be rolled.

Charts which have been finished in freehand lines very often look more professional than those finished with instruments. For this purpose, felt-tipped pens enable easy strokes to be drawn in quick-drying ink. The 'Flomaster' pattern provides a means for varying the density of the lines from black to a shaded grey. Watercolour brushes and thick crayons are also useful in this work.

Bright colours should be used discreetly and chosen to bring out the significance of a picture or to draw attention to essential details. Bright red, yellow or orange areas on a pastel ground are especially effective. Large areas are generally best tinted — for which watercolours are suitable — with outlines and focal points brightly coloured, say, in opaque poster paint. Where masses of colour must be used, as in a column graph for example, the rectangles can be cut from manilla board and stuck to a manilla sheet with, say, Copydex. A narrow space between the strips accentuates the outline (Fig. 23). Lettering often spoils rather than clarifies a chart of this kind, but if lettering is necessary, it may be advisable to stencil, transfer or draw the words on paper strips before attaching them to the drawing. This technique has the dual advantage of preventing damage to the chart through smudging or inaccuracy, and making a preview possible during which the positioning and legibility of the lettering can be correctly estimated under working conditions.

**Felt boards**
A felt board is made by stretching a sheet of best quality felt over a chalkboard (or other flat surface) and pinning it to the back surface. It is good housekeeping to brush it with a stiff brush each time it is used as this not only leaves it with a clean matt surface but roughens it.

Areas of colour, for column graphs or silhouettes, can be cut from felt and need no further preparation. Diagrams, which should be as bold as if they were in chalk on a chalkboard, can be drawn on paper and backed with lint or gridded flock paper. Good effects are obtained if the diagrams are bounded by a wide black edge, the surrounding paper cut away, and the finished diagram used with a black backcloth (Fig. 24). Lint or gridded flock paper should be fixed to the back of the paper so that its fluffy side is outwards.

Enlarged copies of small diagrams can be made with the aid of an episcope. Since the required enlargement is often less than the minimum for which the episcope lens is adjustable, it is usually necessary to remove the lens and support it in front of the instrument. Having outlined the diagram lightly, the paper can be removed from its vertical position and the work finished in comfort.

**Plastigraph**
This is coloured plastic sheeting which can be used in much the same way as felt. Background sheets, which have a smooth working face and matt back, are heavy enough to hang flat under their own weight when supported along their top edges. It is useful to join the top edge to a length of 25 mm. diameter dowel so that the sheet can be rolled for storage. In doing this care should be taken to avoid protrusions of any sort or the material will be permanently deformed.

Plastigraph cut-outs are usually made from thinner, very brightly coloured sheet, but for some purposes this may be too highly reflective, in which case backing sheet can be used and, indeed, looks very attractive. An advantage of the smooth sheets

is that any number of layers can be superimposed on one another: a technique of obvious value in illustrating lessons in geology and ecology.

It is advisable not to draw lines directly on the plastic cut-outs but to smooth a transparent cellophane sheet over the section to be marked and draw on that with a felt pen. For fixing paper or card to such diagrams, special plastic stickers are available.

Material which is to be used many times should be stored flat if possible in folders or envelopes, and gently wiped with a damp cloth if it ever becomes dusty.

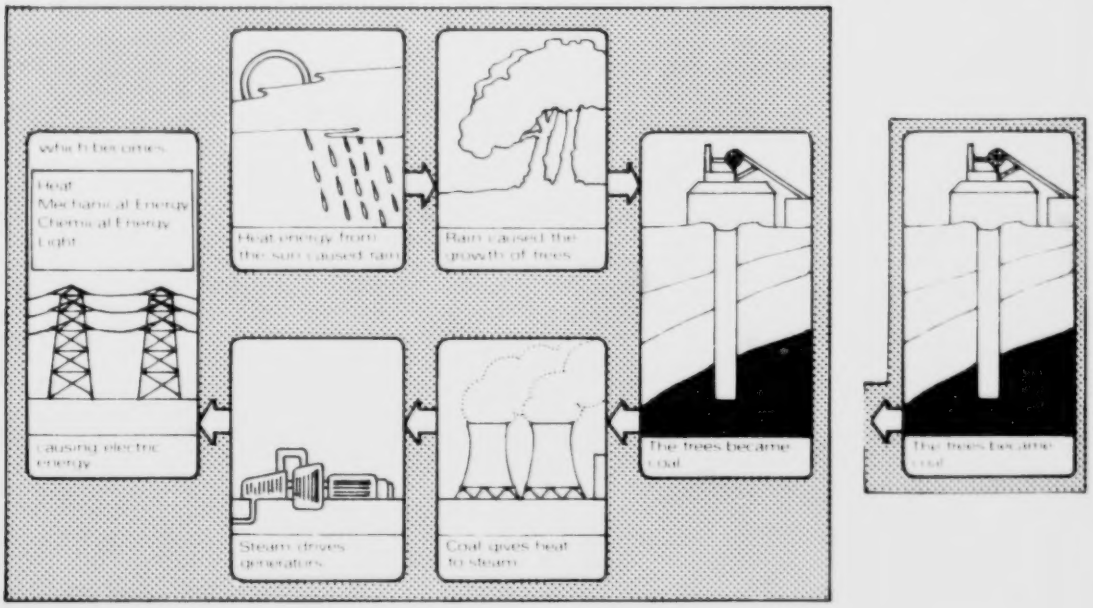
**Magnetic boards**

A sheet of medium thickness tinplate, with its corners rounded and its edges rubbed with a file to make them safe, makes a first class portable magnetic board. This can be painted with a metal primer followed by an undercoat and finishing coat of paint. Alternatively, it can be covered with Fablon. If it is painted with 'blackboard paint' the metal sheet can be used as both a chalkboard and a magnetic board: painted white it can also serve as a projector screen. Cord should be fixed through two holes drilled in one of its edges for hanging. Large permanent boards of black iron sheet can be affixed to a rigid support or, alternatively, magnetic boards are available commercially.

If it is to be used sufficiently often for the same illustration, a permanent outline can be painted on the metal or it can be built up from wood laths or hardboard, fixed to the metal with Bostik, and painted (Fig. 25a). Shapes are cut from ply or hardboard and small disc magnets are stuck to them as shown in Fig. 25b.

'Magnetic' rubber in sheet form can be cut with scissors to make shapes or symbols — it comes in 300 mm. x 50 mm. pieces. Magnetised plastic strip is a useful alternative to disc magnets — not so powerful but cheaper.

Fig. 24. Example of a felt board cut-out. (From *Elementary Physics for Technical Students*, L. S. Powell, Pitman, 1960)



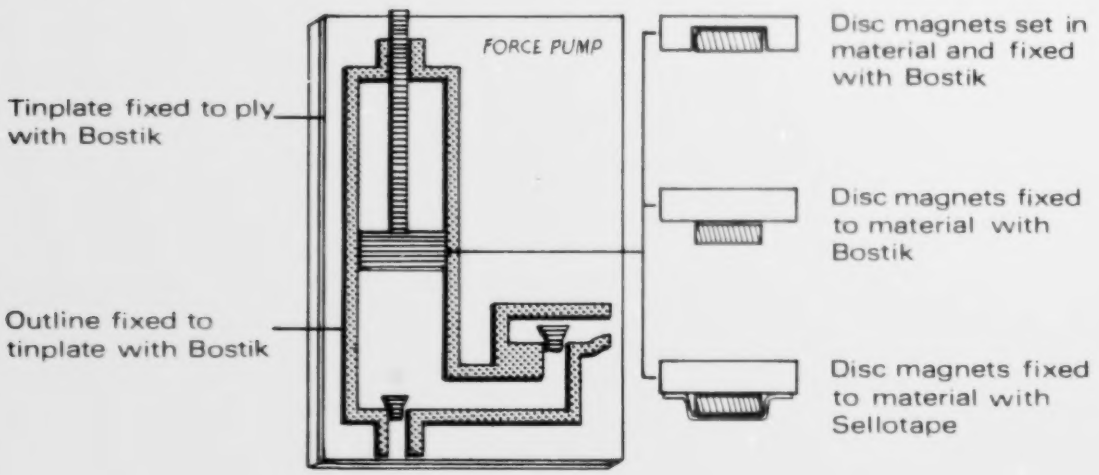
**Slides**
50 mm. square slides can be made, either by cutting frames from a filmstrip and mounting them in slide holders, or by taking 35 mm. photographs of the objects or diagrams to be illustrated. A convenient technique consists of drawing diagrams on a chalkboard using coloured chalks and photographing them on colour transparencies. Amateur photographers are advised to take these pictures out of doors rather than by artificial light as this eliminates exposure difficulties.

**Overhead projector illustrations**
For some teaching purposes actual articles placed on the overhead projector give useful illustrations in the form of silhouettes; small tools, toys, plants and skeletons, for example, whilst others can be used for visual representations; coins can be gear wheels, atoms, rollers or planets. Specially cut shapes are useful in language teaching and recognition exercises — 'Voici la maison de Jean', etc.

Most projectors are provided with a roll of acetate which pulls across the glass projection surface from one roller to another and this can be used as a chalkboard substitute. Pre-prepared illustrations are generally made on acetate or polythene sheets 250 mm. square (Fig. 26a). The writing materials for these purposes include wax or chinagraph-type pencils, felt-tipped pens filled with either water-based or spirit-based inks, stylus pens or script pens used with special ink for writing on plastic. Lines can be made with self-adhesive tapes and areas coloured with self-adhesive transparent films. Instant lettering transfers give a professional finish to captions.

Transparencies may be mounted in cardboard frames with adhesive tape (Fig. 26b). If an illustration is to be developed step by step during a presentation it can be covered with paper masks and then revealed in stages by removing them one

Fig. 25. Magnetic board


FORCE PUMP
Tinplate fixed to ply with Bostik
Outline fixed to tinplate with Bostik
Disc magnets set in material and fixed with Bostik
Disc magnets fixed to material with Bostik
Disc magnets fixed to material with Sellotape
a
b

at a time (Fig. 26c). Alternatively, an illustration can be built up by overlaying additional prepared transparencies as one would turn the pages of a book (Fig. 26d).

Transparencies can also be slid one over the other to show lateral movement of, say, gears, or rotated one on another to show a rotational movement. In addition, models outlined in card, wood, metal and so on, can be constructed on Perspex base plates and also certain experiments lend themselves to projection as they are performed.

Transparencies will be scratched unless they are stored with care and the use of book-like containers which are manufactured for this purpose is strongly recommended.

**Filmstrips**

It is usually simplest to have these processed professionally. Material for the frames should be collected and mounted, arranged in the required sequence, and numbered. It is then sent to one of the firms which specialises in making filmstrips.

**8 mm. loop films**

The secret of producing a good loop film is the care which goes into the preparation before shooting it: it must be scripted, timed, rehearsed and revised until it can be shot, in sequence, with the least likelihood of errors. After it has been processed it must be viewed and, if necessary, edited: it is most important to ensure good splicing because subsequent repairs are difficult. Finally it must be sent away to be fitted into a cassette.

This brief outline has been given for the average busy teacher: enthusiasts will find their way from here by experiments, by reading, and by using the services of the organisations which specialise in visual presentation. Books, addresses and advertisements are therefore included in the following pages.

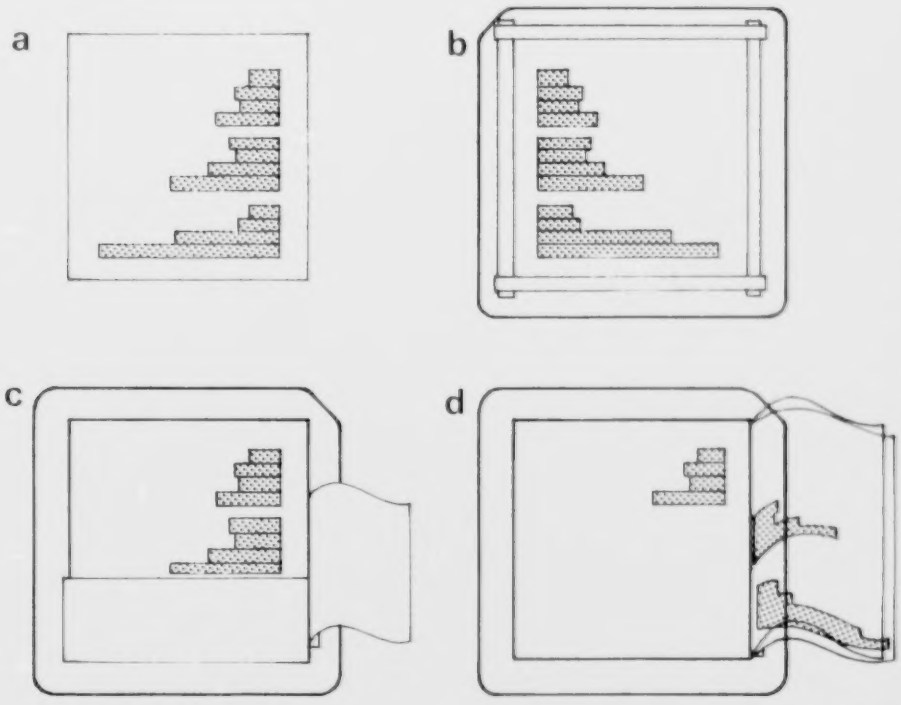



Fig. 26. Illustrations for the overhead projector

# Materials

**In the following list, trade names are sometimes given for convenience, but there are often similar and equally satisfactory materials obtainable. Most can be obtained from art shops or stationers.**

**Quickly-made diagrams**
Newsprint pads (575 mm. x 890 mm.), grey sugar paper (500 mm. x 575 mm. or 750 mm.). Anti-dust coloured chalks or large wrapped crayons. Large felt-tipped writers.

**Wallcharts and diagrams**
Flomaster pens, Graphos or Uno pens. Pelikan 'Plaka' colours are opaque (from artists' dealers). For coloured outlines, Uno pigment drawing inks give even density of line (use in a Uno pen, with a wire one size smaller).

Econasign stencils, used with a brush, give neat lettering. Pen lettering stencils — Uno (especially *Condensed* and *Architects*).

Letraset type transfer sheets (wide range of printing types). Plastitone or Letratone shading film for professional finish to diagrams.

Cellulose wallpaper pastes, for large areas, do not leave stains from splashes (from wallpaper shops). Copydex, a latex based solution, is quick-drying, does not distort and surplus can be rubbed off paper without trace (from stationers). Morane adhesive No. 11 is used for PVC and other sheet plastics, polystyrene cement for solid plastics, and balsa cement has many uses (from model makers' suppliers). Double-sided adhesive tape is useful for mounting exhibits.

**Chart protection**
Edge-binding tape, applied with Admel binder, lengthens life considerably. Surface protection is afforded by self adhesive transparent film, such as Filmolux, or by plastic laminate which is pressed on under heat, e.g. Morane Plastic.

Charts may be mounted on linen and cellulose sprayed. For extreme permanence, diagrams printed on suitable paper may be converted to plastic laminate (Melamine).

**Wall display and exhibitions**
Pin-up boards may be made from Sundeala medium hardboard (timber merchants). To hang pictures on tiled walls or glass use Plastigraph stickers. For fixing to iron surfaces use disc magnets about the size of a 5p piece.

For three-dimensional displays, peg board (builders' or timber merchants') and fittings.

For permanent headings, Graforel relief letters, cut from sheet cork and backed with adhesive.

Ornamental papers, foils, wood veneer papers.

**Feltboard and Plastigraphs**
Background felt 2 m. wide or Dorset drape 2 m. wide. Gridded flock paper.

Plastigraph materials, stickers, Laconite hardboard.

**Overhead projector**
Acetate squares, polythene squares, felt pens, transparency mounts, drafting tape, plastic ink.

**Models**
Balsa wood. Mardel expanded polystyrene. Galt instant papier maché.

**Storage**
Stor steel cabinets for filmstrips, notes, stencils, etc. Railex suspension filing system, with removable manilla wallets for maps, pictures, etc. Arc Light vertical plan file for storing charts vertically.

**Basic equipment**
The following list might be ordered by a teacher who would like to experiment with various materials:

| | |
|---|---|
| Card, manilla, medium quality | 3 sheets of red |
| | 3 sheets of yellow |
| | 3 sheets of blue |
| Card, mounting, 12-sheet royal | 3 sheets of black |
| Cutting tool: craft knife | 1 |
| Paper, cartridge, A1 | 6 sheets |
| Newsprint | 1 pad |
| Colours, Pelikan Plaka | 1 white |
| | 1 vermilion |
| | 1 blue |
| Brushes, sable | 1 of No. 4 |
| | 1 of No. 6 |
| | 1 of No. 8 |
| Brush, decorator's | 1 of 10 mm |
| Copydex adhesive | 1 pot |

# Useful addresses

| | |
|---|---|
| Bostik 252 adhesive | 1 tube |
| Gloy office paste | 1 pot |
| Cosmic crayons | 1 packet |
| Mapping pen | 1 |
| Felt-tipped pens | 6 assorted |
| Indian ink | 1 small bottle |
| White ink | 1 small bottle |
| Felt, best quality, black | 1·5 m. x 2 m. |
| Felt | ½ m. red |
| | ½ m. yellow |
| | ½ m. light blue |
| Tinplate, medium thickness (30 gauge) | 1 sheet |
| Magnets, disc, 20 mm. dia. | 6 |
| Magnetic rubber | 1 sheet |
| Lint, white | 1 packet |
| Hardboard offcuts | |
| Acetate sheets 25 cm. square | 25 |
| Bottle of cleaning fluid | 1 |
| Roll of masking tape | 1 |
| Pelikan ink type T | 1 |
| Gridded flock paper | 3 sheets |
| Lepage's Polystyrene Cement | 1 tube |
| Expanded Polystyrene | 1 sheet |

BACIE, 16 Park Crescent, London WIN 4AP. Tel: 01-636 5351.

Central Film Library, Government Building, Bromyard Avenue, Acton, London W3 7JB. Tel: 01-743 5555.

Central Film Library of Wales, Oxford House, Hill Street, The Hayes, Cardiff, CFI 2XG. Tel: 0222 44171.

Council for Educational Technology, 3 Devonshire Street, London WIN 2BE. Tel: 01-636 4186.

Media Department, British Council, Tavistock House, Tavistock Square, London WCIH 9LB. Tel: 01-387 0166.

National Audio-Visual Aids Centre, 254-256 Belsize Road, London NW6 4BT. Tel: 01-624 8812/4.

National Audio Visual Aids Library, Paxton Place, Gipsey Road, London SE27 9SR. Tel: 01-670 4247/9.

Scottish Central Film Library, 16 Woodside Terrace, Glasgow G3 7XN. Tel: 041 332 9988.

Scottish Council for Educational Technology, 16 Woodside Terrace, Glasgow G3 7XN. Tel: 041 332 9988.

Training Services Division, Manpower Services Commission, 162-168 Regent Street, London WIR 6DE. Tel: 01-214 6743.

# Further reading


**Books**

BEAL, J. D. How to Make Films at School. Focal Press, 1968. 147pp.

COPPEN, H. Aids to Teaching and Learning. Pergamon, 1968. 240pp.

COPPEN, H. (ed.), Survey of British Research in Audio-Visual Aids 1945-71. National Committee for Audio Visual Aids in Education, 1972. 274pp. Third supplement 1976.

COPPEN, H. Wallsheets: choosing, using, making. National Committee for Audio Visual Aids in Education, 1971. 36pp.

ERIKSON, C. W. H. Fundamentals of Teaching with Audio-Visual Technology. 2nd ed. Collier Macmillan, 1972. 381pp.

JONES, J. G. Teaching with Tape. 2nd ed. Focal Press, 1962. 160pp.

KENNEDY, K. Film in Teaching. Batsford, 1972. 128pp.

LAMB, B. Film Strip and Slide Projectors in Teaching and Training. National Committee for Audio Visual Aids in Education, 1971. 110pp.

LANGFORD, M. Visual Aids and Photography in Education. Focal Press, 1973. 352pp.

PAGE, C. F. Technical Aids to Teaching in Higher Education. 2nd ed. Guildford: Society for Research into Higher Education, 1976. 78pp.

POWELL, L. S. A Guide to the Overhead Projector. 2nd ed. (Rev.) impression. BACIE, 1974. 32pp.

POWELL, G. H. & POWELL, L. S. A Guide to the 8 mm. Loop Film. BACIE, 1967. 43pp.

PRINGLE, B. Chalk Illustration: a manual for technical teachers. Pergamon, 1966. 80pp.

RIGG, R. P. Audio-Visual Aids and Techniques in Managerial and Supervisory Training. Hamilton, 1969. 198pp.

SMITH, S. M. (ed.). The Organisation of Audio-Visual Resources for Learning in a Local Education Authority: a report. National Committee for Audio-Visual Aids in Education, 1970. 27pp.

TURNER, P. & ATKINSON, C. R. An Experiment in Closed-Circuit Television at Millfield School. National Committee for Audio-Visual Aids in Education, 1971. 51pp.

WOEFLE, R. M. A Guide for Better Technical Presentation. New York: Institute of Electric and Electronics Engineers, 1975. 230pp.

WITTICH, W. A. & SCHULLER, C. F. Instructional Technology. 5th rev. ed. of Audio Visual materials. Harper and Row, 1973. 640pp.

**Catalogues and Miscellaneous**

BRITISH UNIVERSITIES FILM COUNCIL
Audio-Visual Materials for Higher Education.

KODAK
Audio-visual Projection: motion slide and filmstrips. Pamphlet No. S-3, 1975.

KODAK
Materials for Visual Presentations: planning and preparation. Pamphlet No. S-13, 1977.

KODAK
Wide screen/multiple screen projections. Pamphlet No. S-28, 1973.

KODAK
Let's Stamp out Awful Lecture Slides.

**Other Literature**

ASSOCIATION FOR PROGRAMMED LEARNING AND EDUCATION TECHNOLOGY. Proceedings of annual conferences, occasional publications, a yearbook.

COUNCIL FOR EDUCATIONAL TECHNOLOGY. Directory of information sources, bibliography, occasional papers, user specifications, conferences, reports. A full publications list is available from the Information Officer.

**Periodicals**

BACIE JOURNAL. A monthly journal devoted primarily to vocational training and education in industry and commerce.

BRITISH JOURNAL OF EDUCATIONAL TECHNOLOGY. A journal produced three times a year by the Council for Educational Technology.

BRITISH NATIONAL FILM CATALOGUE. A quarterly publication produced by the British Film Institute.

EDUCATION BROADCASTING INTERNATIONAL. Produced by the British Council. Quarterly.

PROGRAMMED LEARNING AND EDUCATIONAL TECHNOLOGY. Produced six times a year by the Association for Programmed Learning and Educational Technology.

VIDEO AND AUDIO VISUAL REVIEW. A monthly magazine, published by Link House Publications.

VIDEO AND FILM INTERNATIONAL. A monthly magazine, published by King Publications.

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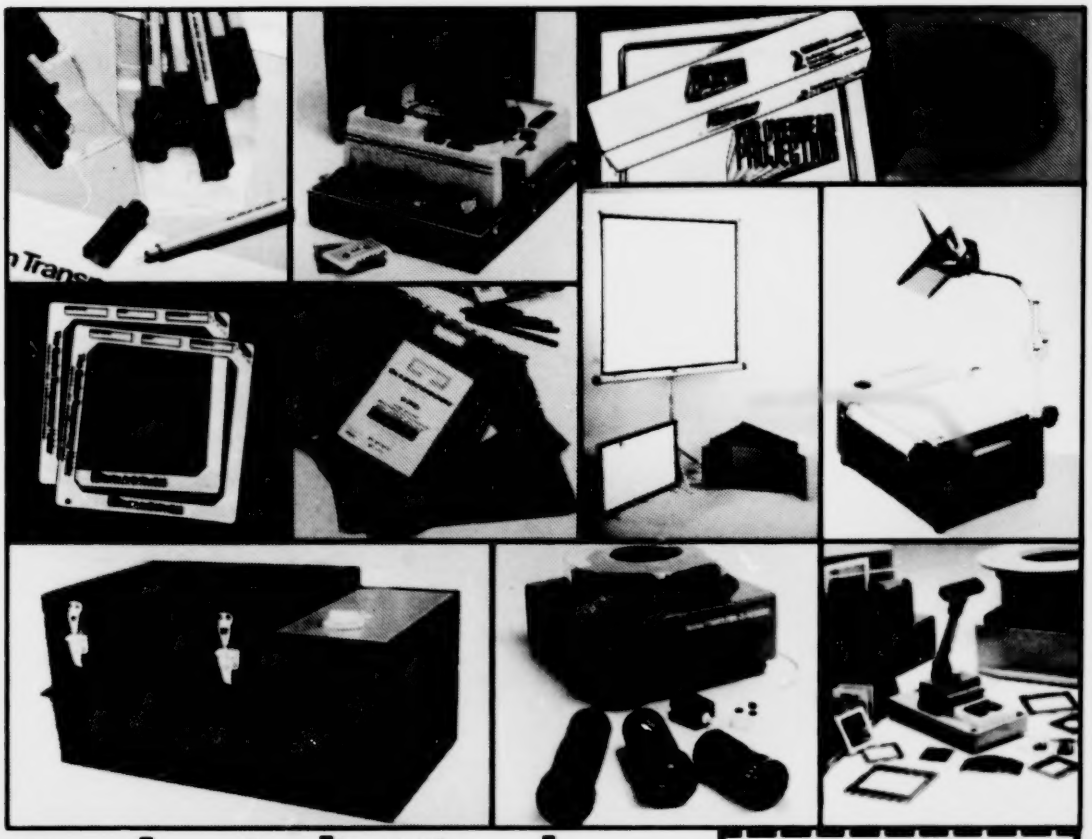

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by L. S. Powell, OBE
A concise description of the instrument itself and its use as a training aid, with a detailed explanation of the production of effective transparencies, diagrams and models.

*ISBN 85171 010 7. 3rd ed, 1980. 28pp, 27,000 printed.*

**A Guide to the Use of Visual Aids**
by L. S. Powell, OBE
Visual aids as a communication system and their effective use are discussed. There are sections on the various types now available, the making of aids, useful materials and relevant publications.

*ISBN 85171 069 7. 4th ed 2nd impress, 1981. 36pp, 44,000 printed.*

**Planning Your Manpower: an Aid to a Year's Training for Small Units**
Provides a comprehensive framework within which the training needs of a department or unit of up to 44 persons can be identified and recorded, thus forming both a working document and a record of training accomplished. It is closely modelled on the aid developed over a number of years by the Ceramics, Glass and Mineral Products ITB for its inscope members.

*ISBN 85171 054 9. 2nd impress, 1980. 18pp, 7,000 printed.*

**A Guide to Asking Questions**
by Ian Mackay
Practical guidance is given on using the right questions to achieve the aims of an inverview. The booklet describes in detail the four main types of questions – open, probe, closed and counter-productive – and provides examples of possible responses to various forms of questions. A section is included for the trainer who may wish to run training sessions on questioning technique.

*ISBN 85171 075 1. 1980. 36pp, 5,000 printed.*

**A Guide to the Use of the Telephone in Business**
Designed to enable all who have to use the telephone to check and improve on their communication technique. Prepared with the co-operation of the Post Office.

*ISBN 85171 001 8. 9th ed, 1975, 20pp, 52,000 printed.*

**A Guide to the Writing of Business Letters**
A step-by-step guide to the writing of clear and concise business letters, which avoids the use of awkward and old-fashioned business English. Sections on words, sentences and punctuation are also included.

*ISBN 85171 004 2. 5th ed, 16th impress, 1980. 20pp, 90,700 printed.*

**Hours into Minutes**
by Dr P. J. C. Perry, OBE
A guide to committee documentation, which contains specimen documents and a checklist to help secretaries prepare agendas, minutes and supplementary papers.

*ISBN 0 905675 02 9. 5th (rev) impress, 1979. 32pp, 25,000 printed.*

**Interviewing in 26 steps**
by J. S. Gough
A useful guide on how to conduct a successful interview. A checklist is included.

*ISBN 85171 012 3. 11th impress, 1981. 16pp 70,000 printed.*

**Report Writing**
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*ISBN 85171 059 X. 2nd ed, 2nd impress, 1979. 44pp, 15,000 printed.*

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*ISBN 85171 013 1. 5th impress, 1981. 32pp, 22,000 printed.*

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**A Manager's Guide to Coaching**
by D. Megginson and T. Boydell
This publication provides guidance for the manager and trainer in initiating coaching in his department or the organisation, or improving upon the existing coaching process.

*ISBN 85171 071 9, 1st impress, 1979. 44pp, 5,000 printed.*

**A Trainer's Guide to Group Instruction**
by Richard Ayres
A comprehensive guide, including reader tasks and practical examples.

*ISBN 85171 067 0. 1977. 32pp, 5,000 printed.*

**A Training Officer's Guide to Discussion Leading**
by A. I. S. Debenham
A guide to the control and handling of a discussion, including sections on the use of questions and hand-outs and specimen discussion outlines.

*ISBN 85171 009 3. 6th impress, 1981. 32pp, 24,000 printed.*

**Welcome Stranger**
by R. Smurthwaite
A guide to school-leavers on what to expect – and what will be expected of them – when they start an office job.

*ISBN 85171 000 X. 6th impress, 1972. 18pp, 30,000 printed.*

**BACIE Case Studies**
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**Case Studies for Practical Training**
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*ISBN 85171 064 6. 1977. 128pp, 2,500 printed.*

**A Handbook of Management Training Exercises Volume 1**
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*ISBN 85171 068 9. 2nd impress, 1980. 160pp, 1,500 printed.*

**A Handbook of Management Training Exercises Volume 2**
Compiled by Dr John Adair and David Després

*ISBN 85171 078 6. 1980. 132pp, 1,000 printed.*

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*ISBN 85171 062 X. 1980. 128pp, 1,500 printed.*

**Combined BACIE Bibliography, Vols 1-4**
Contains bibliography supplements published in the *BACIE Journal* from March 1960 to November 1973, listing over 3,000 publications in the field of industrial and commercial training and education. Contains author and subject indexes.

*ISBN 85171 065 4. 1977. 408pp.*

**The Evolution of British Manpower Policy, from the Statute of Artificers, 1563, to the Industrial Training Act, 1964.**
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In this book, originally prepared as a doctoral thesis, the author sets out the historical background to the 1964 Act and goes on to analyse its origins, purposes, provisions and effects up to the passage of the 1973 Employment and Training Act.

*ISBN 0 905675 00 2 (soft cover); ISBN 0 905675 01 0 (hard cover). 1976. 352pp.*

**Industrial Training Boards Progress Report Eight**
The Report describes the position in July 1979 of the organisation, training activities and levy/grant/exemption schemes of the ITBs and the organisation and activities of the MSC. It includes details of TSD grants, a comparative table of ITB publications showing the subject areas covered by each board, and an organisation chart of the public employment and training services.

*ISBN 85171 074 3. 1979. A4 size, 48pp, 2,000 printed.*

Copies of ITB Progress Reports No. 4 (1969), No. 5 (1970), No. 6 (1973), and No. 7 (1976) are available from BACIE on request.

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